THE ANALYSIS OF THE NOMINAL RATE OF PROTECTION AND THE NOMINAL RATE OF ASSISTANCE TO SELECTED AGRICULTURAL PRODUCTS: A CASE STUDY OF THE REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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ABSTRACT

This paper aimed to estimate the protection of agricultural producers in the Republic of Srpska, Bosnia and Herzegovina, using prices of nine selected products during 2018 – 2023. Two widely recognised indicators were employed: the nominal rate of protection and the nominal rate of assistance. The findings highlight consistent gaps between domestic and EU reference prices, as well as discrepancies and insufficient budget allocation for certain agricultural products. Strong protection was recorded for beef, pig meat, poultry meat and egg producers, while milk and potato protection showed variability. Conversely, wheat, grain maize, and sheep meat were largely unprotected throughout the analysed period. These results suggest that agricultural policy in the Republic of Srpska should prioritise targeted budgetary support, reduce market price disparities and promote productivity-enhancing measures to improve competitiveness and ensure sector sustainability.

Introduction

Following the signing of the Dayton Peace Agreement in 1995, Bosnia and Herzegovina was established as a state with a unique structure, consisting of the Federation of Bosnia

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and Herzegovina (FB&H), the Republic of Srpska (RS) and the Brčko District (DB). This agreement shaped the country's political, economic, and administrative structures, and divided responsibilities, resulting in a complex internal organisation of the state. The state structure has had a significant influence on all sectors of the economy, including agriculture. In Bosnia and Herzegovina, various levels of government develop and implement their own strategies and agricultural policies, with the goal of improving the sector's productivity and competitiveness. This results in diverse approaches, objectives, and challenges in supporting producers and ensuring the sustainability of agricultural production. The agricultural support policies in Bosnia and Herzegovina are primarily directed toward boosting productivity and competitiveness, which remain key priorities for policymakers in this sector, particularly in the context of EU integration. Bosnia and Herzegovina has taken significant steps on this path by signing the Stabilisation and Association Agreement (SAA), attaining EU candidate status in 2022 and launching accession negotiations in March 2024. One of the key challenges for all levels of authority in the country will be aligning domestic agricultural policies with the Common Agricultural Policy of the EU (CAP).

Agriculture in the Republic of Srpska plays a vital role in ensuring food security, fostering rural development, and sustaining economic stability. Its significance is evident in the contribution of agriculture, forestry, and fishery to the GDP with an average of 7.40% (Statistical Yearbook, 2023), an employment rate of 29.8% (Labour Force Survey, 2019[5]), and an average of 6.20% share of the sector in the total exports[6]. Given its importance for economic development, the agricultural policy of the Republic of Srpska has been designed to meet the needs of domestic agricultural producers and to ensure the sector's stability. However, it often sparks discussions about its efficiency and alignment with modern challenges and global trends in agriculture. This sector in the Republic of Srpska (B&H) encompasses significant production of several agricultural products, such as cereals, potatoes, beef, pig meat, poultry meat, eggs, sheep meat and milk. From 2018 to 2023, wheat production averaged 196 thousand tonnes, while grain maize production reached 537 thousand tonnes. Potato production averaged 83 thousand tonnes, while beef production averaged 17 thousand tonnes annually. Pig meat production accounted for 72 thousand tonnes, and sheep meat reached 9 thousand tonnes. Additionally, poultry meat production included 29 thousand tonnes, with annual egg production amounting to 20 thousand tonnes. Milk production was the most significant, averaging 281 thousand tonnes annually[7]. This production made a significant contribution to the overall value of agricultural output, underscoring the importance of aligning development strategies and greater budgetary support in

5 Labour Force Survey (2019), the Agency of Statistics Bosnia and Herzegovina.

6 The calculation of average share of agriculture, forestry, and fishery in the GDP, total employment, and exports is based on data from the Statistical Yearbook (2023), the Institute of Statistics of the Republic of Srpska.

7 The calculation of average production is based on data from the Statistical Yearbook (2023), the Institute of Statistics of the Republic of Srpska.

order to improve productivity, ensure sustainability, and bolster the competitiveness of these sectors.

Taking into consideration strategic documents for agricultural development in the Republic of Srpska, four documents have been adopted so far, namely the Agricultural Development Strategy until 2015; Rural Development Strategic Plan 2009-2015; Agricultural and Rural Development Strategy 2016-2020 and 2021-2027. The agricultural budget was established in 2000 when funds for agriculture were allocated. Food security has been the primary goal of all development strategies for agriculture in the Republic of Srpska, supported by significant allocations of funds for production and income. This was confirmed in a research conducted by Mrdalj (2015), which analysed budgetary support using the APM methodology, excluding the support stemming from market–price policy measures. The findings revealed that the Republic of Srpska's agricultural policy was production and income-oriented, with an average share of 56% of the total budget allocated for direct producer support. Additionally, the research estimated the budget support to agricultural producers (PSE_b) according to implementation criteria and the level of commodity specificity, having highlighted the dominance of output-based payments (A.2), with an average share of 56%, and single commodity transfers (SCT), which accounted for an average share of 54%. Furthermore, Mrdalj (2015) compared the structure of the PSE_b between the Republic of Srpska and the European Union, using two criteria, having identified significant differences in the structure of support measures for agriculture and found notable differences in the structure of agricultural and rural development support measures, as well as in the scale of budget allocations. The pronounced misalignment between the domestic agricultural and rural development support system and the EU framework was largely the result of introducing specific systemic arrangements inherent to CAP reforms.

Therefore, this paper aims to complement the existing analysis by assessing the protection level for agricultural producers through domestic pricing of selected products. In addition, the paper contributes to identifying differences in support levels among selected agricultural products. In this way, the paper aims to provide an understanding of market-price measures and fiscal subsidies which support the Republic of Srpska's agricultural sector, specifically for the selected agricultural products.

The research on agricultural incentives became a key focus for international organisations such as FAO, OECD, and the World Bank. According to Anderson's global analysis of agricultural distortions (2009), information on agricultural incentives was scarce before the 1980s, when the OECD began collecting detailed data, although access to data for developing countries remained limited and fragmented. Later, several key institutions, including FAO, OECD, IFPRI, and the World Bank, jointly contributed to developing the agricultural incentives database (Laborde et al., 2024). Through its AgIncentives Consortium, the International Food Policy Research Institute (IFPRI) has maintained this harmonised database on agricultural incentives, which includes the nominal rate of protection (NRP), and has more recently expanded it to cover the nominal rate of assistance (NRA) (Laborde and Mamun, 2023). This addition provides

a more comprehensive view of the support extended to agricultural producers, further enhancing the global–level analysis of agricultural incentives and their effects on the agricultural sector.

The Food and Agriculture Organization developed the Monitoring and Analysing Policies Incentives Indicators to assess how policies and market conditions affect agricultural prices and producer incentives. Generally, these indicators provide insight into how policies and markets support agricultural growth, food security, and rural development (MAFAP, 2015). The studies conducted by Tsakok (1990), Krueger et al. (1991), and Anderson and Masters (2009) served as a basis for the development and application of MAFAP indicators, used to assess agricultural producer support. The methodology for calculating agricultural support employs two widely applied indicators: NRP and NRA, both grounded in the OECD (2016) approach, especially through the market price differential (MPD), serving as a framework for understanding the effects of market and trade policies. The market price differential is defined as the difference between domestic and reference prices of a commodity, serving as the base for assessing price transfers between producers, consumers, and taxpayers (OECD, 2016). The NRP and NRA indicators measure the scope of influence of trade and market policies, as well as fiscal subsidies that affect domestic prices and support to agricultural producers.

Given that the Institute of Statistics of the Republic of Srpska has encountered challenges with agricultural data which do not ensure a satisfactory extent of reliability and prevent the computing of market price support (MPS) as a component of producers' support estimate indicator (PSE), the assessment of the protection provided for agricultural producers for selected products was conducted using these two indicators. The analysis of the NRP and NRA indicators for nine selected products at the level of the Republic of Srpska covered the period from 2018 to 2023 by examining trends in protection levels and fiscal support mechanisms.

Materials and methods

To achieve the research objectives, two main indicators were applied to evaluate the level of support granted to agricultural producers: The Nominal rate of protection (NRP) and the Nominal rate of assistance (NRA). These measures are based on a standardized methodological framework for policy assessment originally developed by the OECD (2016) and widely adopted by the FAO and other international organisations engaged in agricultural and food policy monitoring (FAO, IFAD, UNICEF, and WHO, 2022). Following the interpretation provided by Erjavec et al. (2017), as referenced in Makaš et al. (2018), the NRP quantifies the degree of price protection by calculating the percentage ratio between the domestic producer's price and the reference price for selected products. Variations in this ratio may arise from direct sectoral measures or product-specific interventions, such as market regulations, trade tariffs or subsidies; from macroeconomic policies, including exchange rate policies and interventions in related sectors; as well as non-policy factors such as market failure. Accordingly, it

assesses the extent to which these policies either encourage (i.e., protect) or discourage (i.e., penalise) producers, offering an estimate of price incentives for an individual commodity, a product group, or the agricultural sector as a whole (FAO, IFAD, UNICEF and WHO, 2022).

Drawing on the methodological approach described by Erjavec et al. (2017) and cited in Makaš et al. (2018), the nominal rate of producer protection was derived according to the following equation:

$$\%NRP_i = \frac{PP_i}{RP_i} * 100 - 100 \quad (1)$$

where:

i – Individual product

%NRP –Nominal Rate of Protection

PP – Producer price

RP – Reference price

The %NRP can be interpreted as follows: a positive NRP at the farm gate level indicates that the producer receives a price for the commodity which is higher than the reference price that would exists without policy interventions. In contrast, a negative NRP means that the producer receives a price lower than the level that would prevail in the absence of intervention. Zero NRP reflects a neutral protection structure. While the NRP is intended to measure the impact of policy-related distortions, in some cases it may primarily reflect non-policy influences, such as the effects of general market performance on prices (FAO, 2022). In many low- and middle-income countries, inefficient market functioning is widespread, driven by factors that hinder price alignment between domestic and international markets. These include weak market integration, unequal distribution of market power, absence of adequate market institutions, and insufficient physical infrastructure (MAFAP, 2015).

The % NRA indicator expands upon the NRP by incorporating commodity - specific public expenditure into the analysis. It captures the combined effect of market price variations and budgetary transfers, offering a more comprehensive assessment of how policy interventions alter producer returns. This indicator expresses the percentage by which government policies through budgetary transfers rises the gross return of producers beyond the level that would be without these interventions.

According to Erjavec et al. (2017), as cited in Makaš et al. (2018), the following formula was used to calculate the NRA:

$$\%NRA_i = \frac{PP_i * QP_i + PE_i}{RP_i * QP_i} * 100 - 100 \quad (2)$$

where:

i – Individual product

%NRA –Nominal Rate of Assistance

PP – Producer price

QP – Quantity of production

RP – Reference price

PE – PSE BOT Budgetary transfer to producers / Fiscal subsidies to producers

The PSE indicator comprises various categories. The PSE category A.1 refers to transfers from consumers and taxpayers to agricultural producers, generated by policy measures that create a gap between domestic market prices and border prices for specific agricultural commodities at the farm gate level.

PSE BOT (PSEb) or fiscal subsidies to producers represent budgetary transfers from taxpayers to individual agricultural producers (sum of categories A.2 to G). These transfers can be granted on the following bases (OECD, 2016):

- *Output* – Category A.2: transfers from taxpayers to agricultural producers resulting from policy measures based on current output of a specific agricultural commodity;
- *Input use* – Category B: transfers from taxpayers to agricultural producers arising from policy measures based on the on –farm use of inputs, including variable inputs (B.1), fixed inputs (B.2) and on – farm services (B.3)
- *Current area, animal numbers, receipts or income, production required* – Category C: transfers from taxpayers to agricultural producers based on current area, animal numbers, receipts (C.2), or income (C.1) with the requirement for ongoing production;
- *Non – current (historical or fixed) area, animal numbers, receipts or income, production required* – Category D: transfers from taxpayers to agricultural producers based on historical or fixed area, animal numbers, receipts, or income, with obligation of current production of any commodity;
- *Non – current (historical or fixed) area, animal numbers, receipts or income, production not required* – Category E: transfers from taxpayers to agricultural producers based on non-current historical or fixed area, animal numbers, receipts or income, without the requirement for current production of any commodity;
- *Non – commodity criteria* – Category F: transfers from taxpayers to agricultural producers provided on the basis of policy measures related to long–term resource retirement or the delivery of specific non – commodity outputs;
- *Miscellaneous payments* – Category G: transfers from taxpayers to agricultural producers for which insufficient information is available to classify them into

the appropriate categories.

The policy support indicators refer to the set of policy instruments are described in Table 1.

Table 1. Overview of agricultural policy instruments and their corresponding indicators

Policy instruments	Corresponding Indicators
A.1 Trade and market–based price incentives	Nominal rate of protection (NRP)
A.2. Output–based fiscal subsidies to producers	Nominal rate of assistance (NRA)
B. Input–based fiscal subsidies to producers	Nominal rate of assistance (NRA)
C. Fiscal subsidies linked to current area, animal numbers, receipts or income, production required	Nominal rate of assistance (NRA)
D. Fiscal subsidies linked to historical (non–current) area, animal numbers, receipts or income, production not required	Nominal rate of assistance (NRA)
F. Fiscal subsidies based on non–commodity criteria	Nominal rate of assistance (NRA)
G. Other or miscellaneous subsidies to producers	Nominal rate of assistance (NRA)

Source: Adopted from FAO, IFAD, UNICEF and WHO, 2022.

Given the high diversity of agricultural production in the Republic of Srpska, the initial aim was to select products that cumulatively account for at least 70% of the total value of agricultural production (OECD, 2016). Due to limited data availability for certain individual commodities, the initial threshold was reduced to 50% to include representative products with sufficient data coverage for the observation period. The final criterion of agricultural product selection was the availability of product-specific data. Therefore, the paper used the data on producer prices for wheat, grain maize, potatoes, various types of meat (beef, pig meat, sheep meat, poultry meat), eggs and milk, sourced from the Economic Accounts and Prices for Agriculture (Bulletin 2023 and 2024), the Institute of Statistics of the Republic of Srpska. The data were obtained through official agricultural reporting systems and are regarded as reliable for the Republic of Srpska's level. To facilitate comparison with domestic prices, EU (world) reference prices were used from the OECD's Producer Support Estimate (PSE) database (2024). This database is widely recognised for its reliability due as result of the OECD's comprehensive methodology in collecting and processing data on producer support. The PSE data ensure consistency across countries and periods, making them highly representative of market conditions within the EU and globally. Anderson (2009) defines the reference price that would prevail in the absence of domestic price, market and trade policy interventions. The selection of an appropriate reference world price is determined by a country's net trade status for specific commodities. When import volumes substantially surpass exports, the commodity is classified as an import; conversely, if exports are greater, it is classified as an export. Due to its small and underdeveloped market, Bosnia and Herzegovina is a net importer of the majority of

agricultural products, primarily sourced from the EU.

Given that the volume of trade in selected products with the EU is significantly higher than with other countries, the EU reference prices can serve as the most relevant benchmark. This is particularly important for EU aspirant countries (Erjavec et al., 2003). Following this approach, the authors also applied the EU reference prices to ensure consistency and relevance of the analysis. As each administrative unit in Bosnia and Herzegovina implements its agricultural policy, the quantitative assessment of budgetary support draws on data from the Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska for the period 2018 – 2023. The fiscal support to producers (PSE_b) was analysed using the implementation criteria.

Results

The research results are divided into two parts. The first one estimates market price differential (MPD) and commodity-specific transfers for selected products, and the second shows the movement of NRP and NRA from 2018 to 2023.

The market price differential and commodity-specific budgetary transfers for selected agricultural products

The tables below display the findings on market price differentials and commodity–specific budgetary transfers for selected agricultural products in the Republic of Srpska (B&H). Since the exchange rate of the convertible mark (BAM) to the euro (EUR)[8] has been fixed and remained stable throughout the analysed period, exchange rate fluctuations did not impact the price analysis.

Table 2 presents the MPD and commodity-specific budgetary transfers to agricultural producers of wheat during 2018-2023.

Table 2. Market price differential (MPD) and fiscal subsidies to wheat producers in millions of BAM from 2018 to 2023

Wheat	MPD (BAM per tonne)	Fiscal subsidies		PE mil. BAM	PE/product (BAM per tonne)	Total PSE_b (mil. BAM)	Share of PE in total PSE_b
		A.2 (mil. BAM)	C.2 (mil. BAM)				
2018	-78.02	0.12	3.85	3.97	21.06	71.00	5.59%
2019	-48.73	3.26	3.33	6.59	34.83	71.00	9.28%
2020	-57.21	0.12	0.00	0.12	0.47	84.89	0.14%
2021	-75.54	0.27	0.00	0.27	1.48	101.45	0.27%
2022	-32.29	7.20	0.00	7.20	37.30	107.26	6.71%
2023	-103.13	11.80	0.00	11.80	69.88	202.25	5.75%

Source: Authors' calculations

8 1 EUR= 1.95583 BAM.

The negative price gap indicated a lower domestic wheat price than the EU reference price during the observed period. Based on the available data, output–based fiscal subsidies to producers (A.2) were identified as the predominant policy instrument for wheat production in the Republic of Srpska. The amount of these payments ranged from 0.12 to 11.80 million BAM. The highest share of budgetary transfers to wheat production, amounting to 9.28% in $PSE_{b,}$ was recorded in 2019. In period However, the share in the total PSE_b fell to 5.75% in 2023, indicating both a rise in overall budgetary transfers to agriculture and a reallocation of funds across various products.

During 2018-2023, domestic grain maize prices were lower than EU reference prices, leading to a negative price gap. Budgetary support for grain maize production was predominantly provided through subsidies linked to current area. However, while budgetary transfers for grain maize production remained stable over the years, their share in total PSE_b decreased. This can be explained as an increase in total agricultural transfers for agriculture, changes in support priorities, or allocation of funds for different agricultural products (Table 3).

Table 3. Market price differential (MPD) and fiscal subsidies to grain maize producers in millions of BAM from 2018 to 2023

Grain maize	MPD (BAM per tonne)	Fiscal subsidies		PE mil. BAM	PE/product (BAM per tonne)	Total PSE_b (mil. BAM)	Share of PE in total PSE_b
		A.2 (mil. BAM)	C.2 (mil. BAM)				
2018	-60.68	0.06	3.30	3.36	5.70	71.00	4.73%
2019	-89.04	0.07	3.30	3.37	5.91	71.00	4.75%
2020	-78.35	0.10	3.30	3.40	4.20	84.89	4.01%
2021	-121.26	0.20	2.75	2.95	6.86	101.45	2.91%
2022	-132.48	0.00	2.75	2.75	7.39	107.26	2.56%
2023	-141.80	0.00	4.13	4.13	9.21	205.25	2.01%

Source: Authors' calculations

Except in 2018, 2022 and 2023, potato producer prices in the Republic of Srpska remained below the EU reference price. Budgetary transfers based on output towards potato production were minimal from 2018 to 2023, mostly lower than one million BAM. The relatively small share of these transfers during the final three years of the observed period suggests that this crop had a lower support priority compared to other types of production (Table 4).

Table 4. Market price differential (MPD) and fiscal subsidies to potato producers in millions of BAM from 2018 to 2023

Potatoes	MPD (BAM per tonne)	Fiscal subsidies		PE mil. BAM	PE/ product (BAM per tonne)	Total PSE_b (mil. BAM)	Share of PE in total PSE_b
		A.2 (mil. BAM)	C.2 (mil. BAM)				
2018	43.87	0.00	0.00	0.00	0.00	71.00	0.00%
2019	-74.83	0.00	0.00	0.00	0.00	71.00	0.00%
2020	-109.18	0.00	0.00	0.00	0.00	84.89	0.00%
2021	-0.09	0.73	0.00	0.73	14.47	101.45	0.72%
2022	340.50	1.42	0.00	1.42	24.70	107.26	1.32%
2023	499.95	0.67	0.00	0.67	10.29	205.25	0.32%

Source: Authors' calculations

Table 5. presents the market price differential and commodity – specific budgetary transfers for different types of meat over the 2018 – 2023 period. Between 2018 and 2023, domestic beef prices consistently exceeded the EU reference price.

Similarly, the same was recorded for pig meat. Budgetary support for beef production was provided through direct payments per animal, including measures like cattle fattening ranging from 120 to 300 BAM and a cow-calf system, amounting from 200 to 400 BAM. The analysed budgetary transfers for beef production were primarily based on subsidies per animal. These transfers varied, with the highest amount recorded in 2021, reaching 4.16 million BAM. However, the budgetary transfers remained relatively stable. The share of these transfers within the total PSE_b declined from 4.39% in 2018 to 2.00% in 2023.

The production of pigs was supported through direct payments per animal, ranging from 90 to 250 BAM for fattening and from 30 to 60 BAM for breeding. From 2018 to 2023, budgetary transfers for pig production were primarily dependent on subsidies linked to animal numbers. Fiscal subsidies linked to animal numbers for pig production rose from 1.70 million BAM in 2018 to 5.52 million BAM in 2022. Although absolute transfers increased, the share of fiscal subsidies based on the number of animals towards pig production in total PSE_b declined after 2022. The negative difference between the domestic and EU reference prices was recorded for sheep meat in 2018-2022. In 2023, the domestic price for sheep meat exceeded the EU reference price, indicating a price disparity between the domestic and the EU market.

In the first three years of the observed period, fiscal subsidies linked to animal numbers for sheep meat production fell from 2.56 million BAM to 0.73 million BAM. These transfers increased from 2021 to 2023, reaching 2.42 million BAM. The share of transfers for sheep meat production showed significant variations in total budgetary support to agriculture during the analysed period. The production of sheep was supported through direct payments per animal, ranging from 20 to 40 BAM for breeding.

Poultry meat had high prices in comparison to the EU reference prices from 2018- 2023. The total fiscal subsidies based on current animal numbers for poultry meat production illustrated a steady increase from 2018 to 2023. They rose from 0.59 million BAM in

2018 to 2.70 million BAM in 2023, indicating a consistent upward trend in budgetary support. The share of these transfers in total PSE_b ranged from 0.83% to 1.32%, showing a gradual increase over the observed period. Broiler production was supported through direct payments, ranging from 0.05 to 0.15 BAM per beak.

Table 5. Market price differential (MPD) and fiscal subsidies to beef, pig meat, sheep meat, and poultry meat producers of in millions of BAM from 2018 to 2023

Beef	MPD (BAM per tonne)	Fiscal subsidies	PE mil. BAM	PE/ product (BAM per tonne)	Total PSE_b	Share of PE in total PSE_b
		C.2				
2018	3.642,49	3.12	3.12	164.00	71.00	4.39%
2019	3.049,06	1.83	1.83	101.67	71.00	2.58%
2020	2.127,34	2.38	2.38	140.20	84.89	2.97%
2021	1.842,42	4.16	4.16	267.15	101.45	4.21%
2022	3.395,03	2.75	2.75	183.11	107.26	2.56%
2023	5.223,81	4.10	4.10	256.13	205.25	2.00%
Pig meat	**MPD (BAM per tonne)**	**Fiscal subsidies**	**PE mil. BAM**	**PE/ product (BAM per tonne)**	**Total PSE_b**	**Share of PE in total PSE_b**
		C.2				
2018	842.39	1.70	1.70	28.79	71.00	2.39%
2019	184.36	2.95	2.95	42.69	71.00	4.15%
2020	72.83	2.81	2.81	37.44	84.89	3.31%
2021	126.65	4.02	4.02	51.55	101.45	3.96%
2022	599.37	5.52	5.52	73.57	107.26	5.14%
2023	2.160,36	5.25	5.25	69.10	205.25	2.56%
Sheep meat	**MPD (BAM per tonne)**	**Fiscal subsidies**	**PE mil. BAM**	**PE/ product (BAM per tonne)**	**Total PSE_b**	**Share of PE in total PSE_b**
		C.2				
2018	-496.30	2.56	2.56	284.56	71.00	3.61%
2019	-1.241,77	0.85	0.85	94.89	71.00	1.20%
2020	-4.749,80	0.73	0.73	91.50	84.89	0.86%
2021	-5.055,14	0.83	0.83	92.00	101.45	0.82%
2022	-2.206,34	0.94	0.94	117.75	107.26	0.88%
2023	538.74	2.42	2.42	302.00	205.25	1.18%
Poultry meat	**MPD (BAM per tonne)**	**Fiscal subsidies**	**PE mil. BAM**	**PE/ product (BAM per tonne)**	**Total PSE_b**	**Share of PE in total PSE_b**
		C.2				
2018	1.111,82	0.59	0.59	20.27	71.00	0.83%
2019	980.45	0.84	0.84	28.98	71.00	1.18%
2020	1.033,56	0.94	0.94	34.71	84.89	1.10%
2021	911.60	1.72	1.72	43.66	101.45	1.20%
2022	669.78	1.37	1.37	41.61	107.26	1.28%
2023	1.211,57	2.70	2.70	90.16	205.25	1.32%

Source: Authors' calculations

Milk is considered as one of the most heavily subsidised agricultural productions in the Republic of Srpska, consistently representing a substantial share of total agricultural budgetary support throughout the observed period.

Table 6. Market price differential (MPD) and fiscal subsidies to milk producers in millions of BAM from 2018 to 2023

Milk	MPD (BAM per tonne)	Fiscal subsidies			PE mil. BAM	PE/ product (BAM per tonne)	Total PSE_b	Share of PE in total PSE_b
		A.2	B.	C.2				
2018	-98.24	28.69	0.12	0.94	29.75	105.38	71.00	41.89%
2019	-83.09	27.32	0.17	1.84	29.33	112.09	71.00	41.30%
2020	-33.53	28.09	1.23	0.38	29.70	108.40	84.89	34.99%
2021	-137.23	29.91	0.71	0.64	31.26	114.54	101.45	30.82%
2022	-263.30	32.78	1.24	0.79	34.81	115.72	107.26	32.45%
2023	31.40	31.80	3.82	11.53	47.15	160.62	205.25	22.97%

Source: Authors' calculations

The share of fiscal subsidies for milk production in total PSE_b declined from 41.89% in 2018 to 22.97% in 2023. Almost one-third of the total budgetary transfers to agriculture referred to subsidies towards milk production from 2020 to 2022. These subsidies were mainly related to output-based production and animal numbers, while in recent years (2020, 2022 and 2023) the amounts for fiscal subsidies that were recorded related to input use, more precisely for fixed input use. The highest budgetary support for milk producers was secured through fiscal subsidies based on output, ranging from 27.32 in 2019 to 32.78 million BAM in 2022. The total support for milk production rose from 29.75 million BAM in 2018 to 47.15 million BAM in 2023. Domestic milk prices remained below EU reference prices throughout the period, except in the final year. Although the absolute amount of support for milk production increased, its share in the total budgetary support decreased. This can be attributed to a rise in overall budgetary transfers towards agriculture.

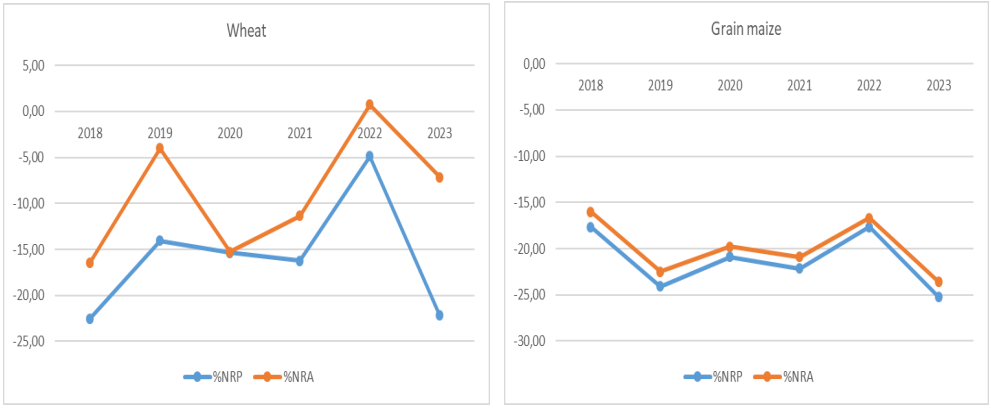
The nominal rate of protection and the nominal rate of assistance to selected agricultural products

This section of the paper is dedicated to analysing the NRP and the NRA to nine selected agricultural products in the Republic of Srpska (Figures 1-5). The analysed NRP indicator of wheat was negative, implying that wheat producers in the Republic of Srpska (B&H) faced low price protection from 2018 to 2023 compared to the EU producers. In 2022, a positive shift (0.75%) in the NRA and the least negative NRP (-4.85%) were recorded.

These results indicate the need for further improvement of government interventions and increased support for wheat producers. Negative market conditions influenced grain maize producers in the Republic of Srpska. Both negative NRP and NRA indicators

indicated a lack of protection for them. The largest decline of the NRP (-25.25 %) and the NRA (- 23.61%) was recorded in 2023.

Figure 1. NRP and NRA for wheat and grain in the period 2018-2023



Source: Authors' calculations

The NRP indicator for potatoes varied during the observed period. A positive shift occurred in 2022 and 2023, with the NRP rising to 87.42% in 2022 and further to 128.18% in 2023, indicating that domestic potato prices exceeded the reference prices. The NRA indicator showed a similar variation to the NRP. In 2022 and 2023, the NRA was 93.76% and 130.81%, indicating higher budgetary support to the domestic producers of potatoes in the Republic of Srpska. The negative NRA in previous years suggested the absence (2018-2020) or less support (2021) for potato producers in the Republic of Srpska. Beef recorded a positive NRP during 2018-2023. This means domestic beef producers were exposed to higher domestic prices in comparison to EU reference prices.

Figure 2. NRP and NRA for potatoes and beef in the period 2018-2023

Source: Authors' calculations

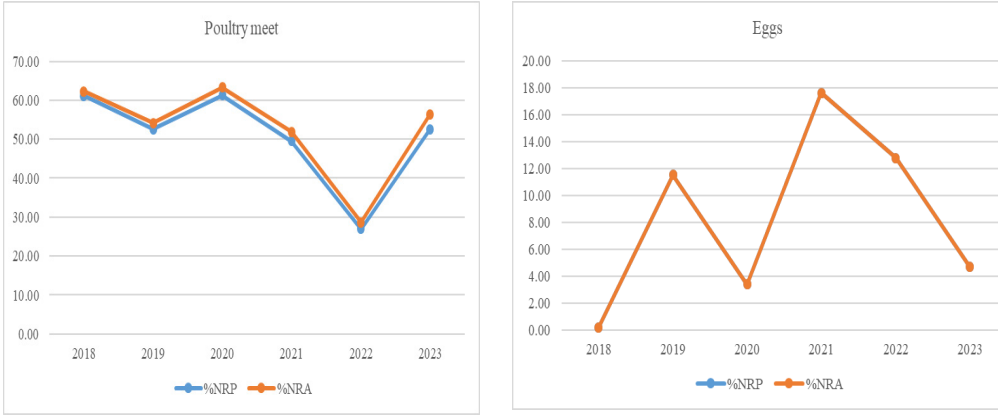
The highest decline of the NRP was recorded in 2021 (28.44%). Similar to the NRP, the NRA to beef was positive over observed period, meaning that beef producers had high budgetary support from the government. The highest decline in the NRA was recorded in 2021 (32.56%). The positive NRP for pig meat indicated that producers largely benefited from favourable market conditions, as domestic prices were higher than the EU reference prices. The positive NRA to pig meat over time implied high budgetary support for agricultural producers.

Figure 3. NRP and NRA for pig meat and sheep meat in the period 2018-2023

Source: Authors' calculations

Among all analysed various types of meat products, sheep meat recorded the negative NRP and NRA, with peaks observed in 2020 and 2021. These results highlight the need for increased investments and support for domestic sheep meat producers in the Republic of Srpska (Figure 3). However, the positive NRP and NRA were recorded in 2023 (3.62%; 5.66 %). In the Republic of Srpska, producers of poultry meat and eggs have largely received price protection and support over time (Figure 4).

Figure 4. NRP and NRA for poultry meat and eggs in the period 2018-2023

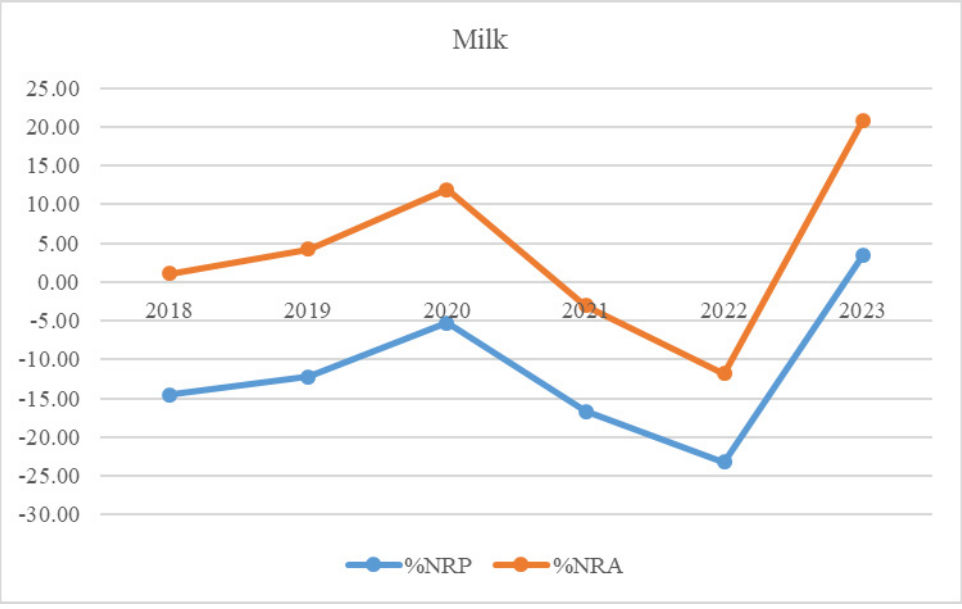


Source: Authors' calculations

The highest NRP and NRA for poultry meat were recorded in 2020 (61.24%; 63.30%). There was no recorded budgetary support for the production of eggs in the Republic of Srpska from 2018 to 2023. However, based on the NRP and NRA indicators calculated, the egg producers experienced favourable market conditions. The producer egg prices were higher than the EU reference prices. The highest NRP and NRA were recorded in 2021 (17.61%).

During the observed period from 2018 to 2022, the NRP indicator for milk was predominantly negative, except in 2023, when a positive NRP of 3.39% was recorded. The positive NRP for milk in 2023 indicated an improvement in the protection of domestic milk production, i.e., the milk price was higher than the EU reference price.

Figure 5. NRP and NRA to milk for the period 2018-2023



Source: Authors' calculations

On the other hand, the NRA indicator for milk exhibited variations; positive values were recorded during 2018-2020 and in 2023, while negative values were recorded during 2021-2022. A positive NRA indicated an increase in the assistance to domestic milk production in certain years of the analysed period, primarily owing to significant budgetary support. Without this support, it is questionable whether the NRA to milk would have been positive, which highlights the importance of government support to ensure the sustainability of domestic milk production.

Discussions

The analysed NRP and NRA indicators offered insight into the extent of price protection and support provided to agricultural producers in the Republic of Srpska, about both the EU market and domestic support measures. By comparing the results of the NRP and NRA indicators for nine selected agricultural products, the policy support for agricultural producers has shown to be heterogeneous across the selected products. The positive NRPs for beef, pig meat, poultry meat, eggs, and in some years for potatoes and milk, reflected domestic prices exceeding EU reference prices. This reflects price distortions and provides incentives for agricultural producers to increase production. Conversely, the negative NRPs for sheep meat and predominantly for wheat and grain maize, signified that EU reference prices were higher than the domestic prices. This suggests that domestic market and trade policies, together with possible market performance factors, have created disincentives for agricultural producers in the Republic of Srpska.The results of NRAs for selected agricultural products provided a comprehensive overview of the overall price distortions.

The positive NRA reflected the extent to which government policies, particularly budgetary transfers, boosted gross returns for producers of beef, pig meat, poultry meat, eggs, and in some years of the observed period for potatoes and milk, beyond the levels attainable without the government intervention. Conversely, the negative NRA indicated how these policies decreased gross returns to wheat, grain maize and sheep meat. The negative NRPs and NRAs collectively indicated a lower level of protection, highlighting potential weaknesses in the existing support policies and their inability to stimulate agricultural production effectively. As seen in comparable countries, the discrepancy in financial support across product groups had created incentive imbalances, as noted in the Republic of Srpska (FAO, 2022).

An examination of potential factors influencing price incentives for agricultural producers of selected products in the Republic of Srpska reveals several notable features of the agricultural sector: (1) *trade commitments*; as a part of the Bosnia and Herzegovin, the Republic of Srpska bound by free trade agreements with the EU and other partners, which affect domestic price levels; (2) *small size and fragmented agricultural holdings*; the prevalence of small-sized and fragmented agricultural holdings limits economies of scale and overall efficiency; (3) *limited market access*; the dominance of small-scale farmers with limited access to markets due to high competition and low resources hinders their competitiveness; (4) *low productivity and high production costs*; partly driven by the application of value-added tax (VAT) on both variable and fixed inputs; (5) *financial support discrepancy and insufficient budget allocations*; differences in the level of financial support across various products along with inadequate budget allocations have created imbalances in incentives.

The FAO (2022) also emphasized the influence of these factors as potential drivers of price incentives in the Eastern Europe, the Caucasus, and Central Asia, regions comparable to Bosnia and Herzegovina, and specifically the Republic of Srpska in

terms of agriculture's significance for economic developments. By implementing policy adjustments for price support, improving the overall market environment and productivity, reducing production costs, harmonising financial support across products, and pursuing long-term structural reforms, the Republic of Srpska can create a more supportive environment for agricultural producers and ensure sustainable agricultural production. To more precisely evaluate the impact of market price policy measures on domestic producer protection, the effective rate of protection (ERP) can be calculated as a complement to the NRP and NRA. The effective rate of protection is calculated exclusively at the farm gate level and assesses the impact of tariffs on imported inputs on the domestic value added per unit of output (MAFAP, 2015). Specifically, it is expressed as the percentage difference between the value added per unit based on reference input and output prices at the farm gate, versus the value added per unit calculated using market prices. As the calculation of ERP requires farm-level production cost data to determine input cost shares relative to output value, which are not available in the statistical database at the level of the Republic of Srpska, this study faced constraints in calculating of this indicator. Hence, this remains a task for subsequent research.

Conclusions

The analysis of the NRP and the NRA provided a valuable insight into the level of protection for agricultural producers in the Republic of Srpska compared to the EU. The results revealed substantial variations in price incentives and public expenditure among selected agricultural products. Targeted policy adjustments and adequate budget allocations are crucial to enhance the efficiency and competitiveness of agricultural production in the Republic of Srpska. The recommendations for future research should also include the development of a comprehensive database for more accurate calculation of agricultural support indicators, enabling a more thorough assessment of how effective of the agricultural policy is, and its long-term impact on this sector in the Republic of Srpska.

Conflict of interests

The authors declare no conflict of interest.

References

1. Anderson, K. (2009). Distortions to agricultural Incentives: a global perspective, 1955-2007. Washington DC, The World Bank. (available at: https://openknowledge.worldbank.org/bitstream/handle/10986/9436/51279.pdf? sequence=3#page=296.)
2. Anderson, K., Masters, W.A, eds (2009). Distortions to Agricultural Incentives in Africa, World Bank, Washington DC
3. Economic accounts and prices for agriculture. Statistical Bulletin 2023. Republic of Srpska, Institute of Statistics.
4. Economic accounts and prices for agriculture. Statistical Bulletin 2024. Republic of Srpska, Institute of Statistics.

5. Erjavec, E., Rednak, M., Volk, T., Turk, J., (2003). The transition from "socialist" agriculture to the common agricultural policy: The Case of Slovenia. Post Communist Economies 15 (4), 557 -569. https://doi.org/10.1080/1463137032000140311

6. FAO (2022). Agricultural policy monitoring for eight countries in Eastern Europe, Caucasus and Central Asia, Rome https://doi.org/10.4060/cc2637en

7. FAO, IFAD, UNICEF, WFP and WHO (2022). The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable, Rome, FAO https://doi.org/10.4060/cc0639en

8. Krueger, A., Schiff, M., Valdes, A. (1991). The Political Economy of Agricultural Pricing Policy. Vol.3.: Africa and the Mediterranean. World Bank. Washington DC.

9. Laborde D., Lallemant T., Majeed F., Mamun A., Martin W., Tokgoz S. (2024). Introducing the updated AgIncentives Database. International Food Policy Research Institute. Washington DC. Available at: https://www.agincentives.org/files/2024/05/Intro_to_AgIncentives_2024_04_30.pdf

10. Laborde D., Mamun A. (2023). Nominal Rate of Assistance (NRA): Data Processing and Treatment. Data Paper. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.136784

11. Labour Force Survey. Thematic Bulletin 10. Agency for Statistics of Bosnia and Herzegovina, (available at: https://bhas.gov.ba/data/Publikacije/Bilteni/2019/LAB_00_2019_TB_0_BS.pdf)

12. Makaš, M., Bajramović, S., Erjavec, E., Rednak M. (2018). Assessment of Overall Support to Agriculture in Bosnia and Herzegovina. Agriculture & Forestry, Vol.64 (4), 165 -172, Podgorica. https://doi:10.17707/AgricultForest.64.4.18

13. Monitoring and Analyzing Food and Agricultural Policies (2015). MAFAP Methodological paper: Volume I. Analysis of price incentives. MAFAP Technical Notes Series, FAO, Rome, Italy (available at: https://www.fao.org/fileadmin/templates/mafap/documents/Methodological_Guidelines/METHODOLOGY_WORKING_PAPER_Vol1_Prices_Incentives.pdf)

14. Mrdalj, V. (2015). Komparacija struktura budžetske podrške poljoprivrednim proizvođačima na nivou Republike Srpske i Evropske Unije. Agroznanje vol.16, br.4, 477-490, doi: 10.7251/AGRSR1504477M [*in English*: Mrdalj, V. (2015). Comparison of the Structure of Budgetary Support to Agricultural Producers (PSEb) at the level of the Republic of Srpska and the European Union. Agroknowledge, vol.15 no. 4, 477-490. doi: 10.7251/AGRSR1504477M]

15. Mrdalj, V. (2015). Quantitative and Qualitative Analysis of the Agricultural Policy of Entity Republic of Srpska (Bosnia and Herzegovina). Symposium proceedings, 2nd International symposium for agriculture and food, ISAF, 7-9 October 2015, Ohrid, Republic of Macedonia – Skopje, Vol 1, 111-122.

16. OECD (2016). Oecd's Producer Support Estimate and Related Indicators of Agricultural Support. Concepts, Calculations, Interpretation and Use (The PSE Manual). OECD Publishing Paris
17. OECD (2024). Agricultural Policy Monitoring and Evaluation: all data (available at: https://data-explorer.oecd.org)
18. Regulations on the Conditions and Manner of Obtaining Financial Incentives for the Development of Agriculture and Rural Areas for 2018 (Official Gazette Republic of Srpska Nr. 25/18)
19. Regulations on the Conditions and Manner of Obtaining Financial Incentives for the Development of Agriculture and Rural Areas for 2019 (Official Gazette Republic of Srpska Nr. 18/19; 7/20; 8/21; 4/22;11/23)
20. Regulations on the Conditions and Manner of Obtaining Financial Incentives for the Development of Agriculture and Rural Areas for 2020 (Official Gazette Republic of Srpska Nr. 7/20)
21. Regulations on the Conditions and Manner of Obtaining Financial Incentives for the Development of Agriculture and Rural Areas for 2021 (Official Gazette Republic of Srpska Nr. 8/21)
22. Regulations on the Conditions and Manner of Obtaining Financial Incentives for the Development of Agriculture and Rural Areas for 2022 (Official Gazette Republic of Srpska Nr. 4/22)
23. Regulations on the Conditions and Manner of Obtaining Financial Incentives for the Development of Agriculture and Rural Areas for 2023 (Official Gazette Republic of Srpska, Nr.11/23)
24. Rural Development Strategic Plan of the Republic of Srpska 2009-2015, Government of the Republic of Srpska.
25. Statistical Yearbook (2023), Institute of Statistics, Republic of Srpska, (available at: www.rzs.rs.ba)
26. Strategic Plan for the Development of Agriculture and Rural Areas of the Republic of Srpska 2016-2020. Government of the Republic of Srpska. (2015).
27. Strategic Plan for the Development of Agriculture and Rural Areas of the Republic of Srpska 2021-2027. Government of the Republic of Srpska. (2020).
28. Strategic Plan for the Development of Agriculture of the Republic of Srpska until 2015. Government of the Republic of Srpska. (2006).
29. Tsakok, I. (1990). Agricultural price policy. A Practitioner's Guide to Partial Equilibrium Analysis, Cornel University Press, Ithaca and London.